VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. (Amended) A communication apparatus, comprising:

first coding means for creating [a] first coded data including audio signals coded by using a first coding method;

second coding means for creating [a] second coded data including audio signals coded by using a second coding method that is different from said first coding method; [and]

control means for switchably selecting at least one of said first coded data created by said first coding method and said second coded data created by said second coding method; and

sending means for sending the selected at least one of said first coded data and said second coded data to another communication device,

wherein said sending means sends said first coded data and said second coded data when said control means switches selection [a coding method is switched] from said first coding method to said second coding method while said communication apparatus is in [during] communication with the other [communicating party] communication device.

5. (Amended) A communication apparatus according to claim 1, wherein

said control [sending] means does not select [send] said second coded data until a predetermined time has passed [passes] since said second coding means starts creating said second coded data.

7. (Amended) A method of operating a communication apparatus, comprising:

a first coding step for creating first coded data including audio signals coded by using a first coding method;

a second coding step for creating second coded data including audio signals coded by using a second coding method that is different from said first coding method; [and]

a control step for switchably selecting at least one of said first coded data created by said first coding method and said second coded data created by said second coding method; and

a sending step for sending the selected at least one of said first coded data and said second coded data to another communication device,

wherein said sending step sends said first coded data and said second coded data when said control step switches selection [a coding method is switched] from said first coding method to said second coding method while said communication apparatus is in [during] communication with the other [communicating party] communication device.

11. (Amended) A method according to claim 7, wherein said control [sending] step does not select [send] said second coded data until a predetermined time has passed [passes] since said second coding means starts creating said second coded data.

13. (Amended) A communication apparatus, comprising:

receiving means for receiving [sending] at least one of first coded data including audio signals coded by using a first coding method and second data including audio signals coded by using a second coding method that is different from said first coding method;

first decoding means for decoding said first coding data [method];

second decoding means for decoding said second coded data; [and]

control means for switchably selecting at least one of audio signals outputted by said first decoding means and audio signals outputted by said second decoding means; and

output means for outputting the [either one of] audio signals selected by said control means [output from said first decoding mean and audio signals output from said second decoding means],

wherein said receiving means receives said first coded data and said second coded data when said control means switches selection [a coding method is switched] from said first coding method to said second coding method while said communication apparatus is in [during] communication with another [the other] communicating device [party].

17. (Amended) A communication apparatus according to claim 13, wherein said control [receiving] means does not select [output] audio signals outputted from said second decoding means until a predetermined time has passed [passes] since said second decoding means starts decoding said second coded data.

19. (Amended) A method of operating a communication apparatus, comprising:

a receiving step for receiving at least one of first coded data including audio signals coded by using a first coding method and second data including audio signals coded by using a second coding method that is different from said first coding method;

a first decoding step for decoding said first coding data [method];

a second decoding step for decoding said second coded data; [and]

a control step for switchably selecting at least one of said audio signals outputted in said first decoding step and said audio signals outputted in said second decoding step; and

an output step for outputting the [either one of] audio signals selected in said control step [output from said first decoding mean and audio signals output from said second decoding means],

wherein said receiving step receives said first coded data and said second

coded data when said control step switches selection [a coding method is switched] from said first coding method to said second coding method while said communication apparatus is in [during] communication with another communication device [the other communicating party].

23. (Amended) A method according to claim 19, wherein said control [receiving] step does not select [output] audio signals outputted from said second decoding means until a predetermined time has passed [passes] since said second decoding means starts decoding said second coded data.

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1. TITLE OF THE INVENTION

COMMUNICATION APPARATUS AND METHOD OF OPERATING COMMUNICATION APPARATUS

2. BACKGROUND OF THE INVENTION

(a)Field of the Invention

The present invention relates to ~~a~~ communication apparatuses which perform ~~apparatus including~~ several kinds of coding methods ~~or~~ and/or decoding methods, and ~~a~~ methods ~~of operating the same~~ for operating said apparatuses.

(b)Description of the Related Art

As a method for switching a coding method during communication with ~~the~~ an other communicating party, the following methods are known, ~~for example~~: A first method performs switching after sending a switching request, and ~~A~~ a second method performs switching after receiving a response for a switching request.

However, in the first method, since, ~~during a period~~ because there may be a delay between ~~from~~ ~~a~~ the time when a sending communication apparatus ~~at the sending side~~ switches ~~a~~ from a first coding method to a second coding method ~~to~~ and a time when a receiving communication apparatus ~~at the receiving side~~ switches ~~a~~ to a decoding method corresponding to the second coding method, at least some of the ~~the communication apparatus at the receiving side decodes~~ audio and/or video data coded ~~in the coding~~ using the second coding method ~~after~~ may be decoded using an inappropriate decoding method.

~~switched by using a decoding method corresponding to the coding method before switched,~~ this can cause problems such as undesired problems ~~regarding the occurrence of~~ noise and/or turbulence of video ~~are raised.~~

On the other hand, in the second method, ~~during the~~ because there is a delay between ~~period from~~ a time when a receiving communication apparatus ~~at the receiving side~~ switches a decoding method ~~to~~ and a time when a sending communication apparatus ~~at the sending side~~ switches a coding method, ~~since~~ the receiving communication apparatus also might decode received audio and/or video data ~~coded in a coding method before switched by using a decoding method corresponding to a coding method after switched,~~ using an inappropriate decoding method, and thus, problems ~~regarding the occurrence of~~ such as noise and/or turbulence of video ~~are raised.~~ can also occur in this case.

Thus, recently, ~~for example~~, a method ~~is~~ has been proposed ~~that~~ wherein ~~an~~ audio and/or video data is muted for a certain period of time when a coding method is switched, and then the audio and/or video data is outputted gradually in order to suppress the occurrence of noise and/or turbulence of video. However, in this method, while the occurrence of noise can be suppressed, ~~but~~ another problem ~~is raised~~ can occur in that voice and/or video ~~are~~ may be interrupted.

Further, among coding methods or decoding methods, there exists a method that feeds back past information for coding or decoding. In this method, if a coding method or a decoding method is switched before coding processing or decoding processing become stable, problems ~~regarding the~~ such as

~~occurrence of~~ noise and/or turbulence of video ~~are raised~~. can occur.

3. SUMMARY OF THE INVENTION

In accordance with this invention, apparatuses and methods in accordance with various embodiments of the invention are provided which achieve the object of the invention.

An object of the present invention is to solve the above-described problems. ~~As~~ In one ~~preferred~~ preferred embodiment of the invention ~~under such a object~~, a communication apparatus is provided that includes ~~of the present invention includes~~ a first coding unit for creating a first coded data including audio signals coded by using a first coding method, a second coding unit for creating a second coded data including audio signals coded by using a second coding method that is different from the first coding method, and a sending unit (transmitter) for sending the selected at least one of the first coded data and the second coded data to another communication device. ~~In this case,~~ The sending unit sends the first coded data and the second coded data when the control unit switches selection ~~a coding method is switched~~ from the first coding method to the second coding method, while the communication apparatus is in ~~during~~ communication with ~~the~~ the other communicating ion device. ~~party~~.

a control unit for switchably selecting at least one of said first coded data created by said first coding method and said second coded data created by said second coding method;

In accordance with ~~Also, as~~ another aspect of this invention ~~embodiment~~, a method of operating a communication apparatus is provided. The method comprises ~~of the present invention includes~~ a first coding step for creating first coded data including audio signals coded by using a first coding method, a second coding step for creating second coded data including audio signals coded by using a second coding method that is different from the first coding method, and a sending step

a control step of switchably selecting at least one of the first coded data created by the first coding method and the second coded data created by the second coding method

the control step switches selection

the selected

for sending at least one of the first coded data and the second coded data to another communication device. ~~In this case,~~ the sending step sends the first coded data and the second coded data when ~~a coding method is switched~~ from the first coding method to the second coding method while the communication apparatus is in communication with ~~the~~ other communicating ~~party~~ device. during

~~Further, as another embodiment,~~ A communication apparatus in accordance with another embodiment of the present invention ~~includes~~ comprises (a) a receiving unit for ~~sending~~ receiving at least one of first coded data including audio signals coded by using a first coding method and second data including audio signals coded by using a second coding method that is different from the first coding method, (b) a first decoding unit for decoding the first coded data ~~coding method~~, (c) a second decoding unit for decoding the second coded data, ~~and~~ (d) an output unit for outputting ~~either one of~~ the audio signals ~~outputted from the first decoding unit and audio signals outputted from the second decoding unit.~~ selected by the control unit. ~~In this case, wherein~~ The receiving unit receives the first coded data and the second coded data when the control unit switches selection ~~a coding method is switched~~ from the first coding method to the second coding method while the communication apparatus is in communication with ~~the~~ an other communicating ~~party~~ device. during

~~Furthermore, as another embodiment,~~ A method of operating a communication apparatus according to another embodiment of the present invention comprises (a) ~~includes~~ a receiving step for receiving at least one of first coded data including audio signals coded by using a

a control unit for switchably selecting at least one of audio signals outputted by said first decoding unit and audio signals outputted by the second decoding unit, and (e)

a control step of switchably selecting at least one of the audio signals outputted in the first decoding step and the audio signals outputted in the second decoding step, and (e)

first coding method and second data including audio signals coded by using a second coding method that is different from the first coding method, (b) a first decoding step for decoding the first coding method, (c) a second decoding step for decoding the second coded data, ~~and~~ (d) an output step for outputting ~~either one of~~ the audio signals selected in the control step ~~output from the first decoding unit and audio signals output from the second decoding unit. In this case,~~ the receiving step in this embodiment receives the first coded data and the second coded data when ~~a coding method is switched~~ the control step switches selection from the first coding method to the second coding method ~~during~~ while the communication apparatus is in communication with ~~the other party.~~ another communicating device.

Still other objects of the present invention, and the advantages thereof, will become fully apparent from the following detailed description of the various embodiments of the present invention.

4. BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing ~~a main~~ the construction of a packet communication apparatus (sending side) according to a first embodiment of the present invention;

Fig. 2 is a block diagram showing ~~a main~~ the construction of a packet communication apparatus (receiving side) according to the first embodiment of the present invention;

Fig. 3 is a diagram for describing one example of main

processing steps of a packet communication apparatus according to the first embodiment of the present invention;

Fig. 4 is a diagram for describing another example of main processing steps of a packet communication apparatus according to the first embodiment of the present invention;

Fig. 5 is a flowchart for describing main processing steps of a packet communication apparatus according to the first embodiment of the present invention;

Fig. 6 is a flowchart for describing main processing steps of a packet communication apparatus according to the first embodiment of the present invention;

Fig. 7 is a flowchart for describing main processing steps of a packet communication apparatus according to the first embodiment of the present invention;

Fig. 8 is a diagram showing ~~a~~ the construction of a data packet according to the first embodiment of the present invention;

Fig. 9 is a diagram showing ~~a~~ the construction of a data packet according to a second embodiment of the present invention;

Fig. 10 is a diagram showing an example of main processing steps of a packet communication apparatus according to the second embodiment of the present invention; and

Fig. 11 is a diagram showing another example of main

processing steps of a packet communication apparatus according to the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the present invention will now be described in detail, ~~hereinafter~~ with reference to the accompanying drawings.

Embodiment 1

Fig. 1 is a block diagram showing an example ~~one construction example~~ of a packet communication apparatus (sending transmitting side) constructed according to a first embodiment of the present invention.

The apparatus of Fig. 1 includes a packet communication apparatus (sending side) 100 according to a first embodiment, an audio processing apparatus 101, a packet network 112, and an image processing apparatus 113. The audio processing apparatus 101 includes a microphone or a voice playback apparatus, for example, and outputs analog audio signals in a predetermined audio format. The packet network 112 includes a Local Area Network (LAN), a Wide Area Network (WAN), the Internet, a satellite communication line, a serial bus or wireless LAN compliant with the IEEE1394-1995 standard, (for example,) or some other suitable type of network. The image processing apparatus 113 preferably includes a video camera or a video playback apparatus and outputs analog video signals in

In other embodiments, a predetermined video format. ~~The~~ the audio processing apparatus 101 and/or the image processing apparatus 113 may be included within the packet communication apparatus 100, ~~for example~~ although this is not shown in the first embodiment of Fig. 1.

Further, Fig. 1 includes an input portion 102, a select portion 103, and a control portion 109. The input portion 102 converts analog audio signals outputted from the audio processing apparatus 101 to digital audio signals and/or converts analog video signals outputted from the video processing apparatus 113 to digital video signals. The select portion 103 supplies audio and/or video signals outputted from the input portion 102 to at least one coding portion ~~104-i (i = 1 to N (N is an integer of 2 or above))~~ 104-1 to 104-n in accordance with an instruction from the control portion 109.

Each coding portion ~~104-i (i = 1 to N)~~ 104-1 to 104-n codes predetermined, respective audio or video or/and video signals having a same content by using a coding method ~~each has~~ of the coding portion 104-1 to 104-n. An audio coding method ~~that~~ employed by each coding portion ~~104-i (i = 1 to N) has~~ 104-1 to 104-n may ~~be~~ in accordance with, the Moving Picture Experts Group (MPEG) 1 audio method compliant with the ISO/IEC 13818-3 standard, the Adaptive Differential PCM (ADPCM) method, Sub-band ADPCM (SB-ADPCM) method, or Low-Delay Code Excited Linear Prediction(LD-CELP) method, for example. Further, ~~a~~ the video coding method employed by ~~that~~ each coding portion ~~104-i (i = 1 to N)~~ 104-1 to 104-n may include, for example, ~~may be~~ the MPEG 1 method compliant with the ISO/IEC11172-2 standard or the MPEG 2 method compliant with

the ISO/IEC 13818-2 standard, ~~for example~~. It should be noted that the ~~combination of the~~ audio coding method and video coding method ~~that~~ of each coding portion ~~104-i (i = 1 to N)~~ 104-1 to 104-n preferably ~~has~~ differs for every other coding portion ~~104-i (i = 1 to N)~~ 104-1 to 104-n.

Further, Fig. 1 includes a select portion 105, a communication portion 106, an operating portion 114, and a timer 115. The select portion 105 supplies coded data outputted from at least one coding portion 104~~-i (i = 1 to N)~~ -1 to 104-n in accordance with an instruction from a control portion 109.

The communication portion 106 creates a data packet including coded data outputted from the select portion 105 and sends the created data packet to ~~the other~~ another packet communication apparatus (e.g., Fig 2). Further, the communication portion 106 creates a control packet including control data (e.g., a switching request, switching response, switching confirmation, for example, described below) outputted from the control portion 109 and sends the created control packet to the other packet communication apparatus. Furthermore, the communication apparatus 106 receives a control packet sent from the other packet communication apparatus through the network 112 and supplies control data (e.g., a switching request, switching response, switching confirmation, for example, described below) included in the received control packet to the control portion 109. The communication portion 106 preferably includes a LAN controller, a Transmission Control Protocol/Internet

Protocol (TCP/IP) Protocol stack, a serial bus controller or a wireless LAN controller, for example.

The control portion 109 controls ~~an~~ the overall operation of the packet communication apparatus 100 (sending side) by following processing steps described below. It should be noted that the control portion 109 preferably includes a microcomputer, a memory and different kinds of control programs for implementing those processing steps. The operating portion 114 displays a currently selected coding method, displays a selectable coding method, or inquires ~~of~~ a user about a coding method after switching occurs, as will be described below. The timer 115 measures a time that is sufficient enough for enabling processing steps of ~~the~~ a switched coding method to be acceptably stable.

Fig. 2 is a block diagram showing ~~one construction~~ an example of a packet communication apparatus (receiving side) constructed according to the first embodiment of the present invention. The apparatus of Fig. 2 preferably includes a packet communication apparatus (receiving side) 200, an audio processing apparatus 201, and an image processing apparatus 213. The audio processing apparatus 201 preferably includes a speaker or an audio recording apparatus. The image processing apparatus 213 preferably includes a video recording apparatus or a display apparatus such as a CRT, a liquid crystal panel, ~~and~~ or a plasma display panel. In other embodiments ~~The~~ the audio processing apparatus 201 and/or the image processing apparatus 213 may be included within the packet

communication apparatus 200, although this is not shown in figure 2.

Further, the packet communication apparatus 200 preferably comprises ~~includes,~~ a communication portion 206, a select portion 205, and a control portion 209. The communication portion 206 receives ~~a~~ data packets sent ~~from the other~~ another packet communication apparatus, such as, for example, the apparatus shown in Fig. 1, and supplies coded data included in the received data packet to the select portion 205. Further, the communication portion 206 receives a control packet sent from the other packet communication apparatus and supplies control data (e.g., a switching request, switching response, switching confirmation, ~~for example~~, described below) included in the received control packet to the control portion 209. Further, the communication portion 206 creates a control packet including the control data (e.g. switching request, switching response, switching confirmation, for example, described below) supplied from the control portion 209 and sends the created control packet to the other packet communication apparatus. The communication portion 206 preferably includes a LAN controller, a Transmission Control Protocol/Internet Protocol (TCP/IP) Protocol stack, a serial bus controller or a wireless LAN controller, for example.

The select portion 205 supplies coded data outputted from the communication portion 206 to at least one selected decoding portion 204-~~i (i = 1 to N (N is an integer of 2 or above))~~ 1 to 204-n in accordance with an instruction from the control portion

209.

Each decoding portion 204-~~i (i = 1 to N)~~ -1 to 204-n decodes audio or/and video signals having a same content ~~by using a~~ according to a corresponding predetermined decoding method ~~each has~~. An audio decoding method ~~that~~ employed in each decoding portion 204-~~i (i= 1 to N)~~ -1 to 204-n ~~includes~~ corresponds to an audio coding method ~~that each~~ employed by the same coding portion 104-~~i (i = 1 to N) includes~~ 1 to 104-n. Further, a video coding method ~~that~~ employed by each decoding portion 204-~~i (i = 1 to N)~~ -1 to 204-n ~~includes~~ corresponds to a video coding method ~~that each~~ performed by coding portion 104-~~i (i = 1 to N) includes~~ -1 to 104-n. It should be noted that the ~~combination of the~~ audio decoding method and video decoding method ~~that~~ employed by each decoding portion 204-~~i (i = 1 to N) has~~ -1 to 204-n differs ~~for every~~ from those employed by the decoding portion 204-~~i (i = 1 to N)~~ -1 to 204-n.

The select portion 203 supplies audio and/or video signals outputted from at least one selected decoding portion 204-1 to 204-n ~~(i = 1 to N)~~ to an output portion 202, in accordance with an instruction from the control portion 209.

The output portion 202 converts digital audio signals outputted from the select portion 203 to analog audio signals and supplies the converted analog audio signals to the audio processing apparatus 201.

The output portion 202 also converts digital video signals outputted from the select portion 203 to analog video signals and supplies the converted analog video signals to the ~~video~~ image processing apparatus 213.

The control portion 209 controls the overall operation of the packet communication apparatus 200 (receiving side) by following processing steps described below. It should be noted that the control portion 209 preferably includes a microcomputer, a memory and various types of control programs. The operating portion 214 displays a currently selected coding method, displays a selectable coding method, or inquires of a user about a coding method after switching occurs. The timer 215 measures an amount of time that is sufficient enough for enabling processing steps of the switched coding method to become substantially stable.

Next, by referring to Fig. 8, a construction of a data packet according to a first embodiment of the present invention will be described.

As shown in Fig. 8, a data packet 800 according to the first embodiment includes a header 801, coding method information 802, coded data 803, and a footer 804. The header 801 includes information for identifying a communicating party, for example. The coding method information 802 includes information indicating a coding method for the coded data 803 and a decoding method corresponding thereto. The coded data 803 includes audio and/or video signals coded by using a first coding method (prior to switching) (a first coding method that a first coding portion 104-1 includes). The footer 804 includes information for detecting or correcting an error occurred in a data packet,

for example.

Further, as shown in Fig. 8, ~~a~~ another data packet 810 according to the first embodiment includes a header 811, coding method information 812, coded data 813 and a footer 814. The header 811 includes information for identifying ~~the other~~ a communicating party, for example. The coding method information 812 includes information indicating a ~~de~~coding method for the coded data 813 and a decoding method corresponding thereto. The coded data 813 includes audio and/or video signals coded by using a coding method after switch~~ed~~ing (a second coding method that a second coding portion 104-2 includes). The footer 814 includes information for detecting or correcting an error that occurred in a data packet, for example.

Next, by referring to Fig. 3, ~~it~~ will be described ~~one~~ an example of main processing steps of packet communication apparatuses 100 and 200 according to the first embodiment. In Fig. 3, ~~it~~ will be described processing steps for an exemplary ~~in a~~ case where, during communication with the packet communication apparatus 200 (receiving side), the packet communication apparatus 100 (sending side) requests switching of a coding method. Further, ~~in~~ Fig. 3 ~~a case~~ will be described in the context where the coding method before switch~~ed~~ing is a first coding method employed by ~~that~~ a first coding portion 104-1 ~~includes, for example,~~ while the coding method after switch~~ed~~ing is a second coding

method that a second coding portion 104-2 ~~includes~~ employs, for example.

First of all, a processing step ~~of a step~~ S301 will be described. The input portion 102 converts analog audio signals outputted from the audio processing apparatus 101 to digital audio signals. Also, the input portion 102 converts the analog video signals output from the ~~video~~ image processing apparatus 113 to digital video signals. The select portion 103 supplies audio and/or video signals outputted from the input portion 102 to the first coding portion 104-1. The first coding portion 104-1 codes the audio and/or video signals supplied from the select portion 103 and creates coded data 803, sequentially. The select portion 105 supplies the coded data 803 outputted from the first coding portion 104-1 to the communication portion 106, which, in turn, creates a data packet 800 including the coded data 803, sequentially, and sends it to the packet communication apparatus 200 sequentially, through the packet network 112.

At the packet communication apparatus 200,

The communication portion 206 sequentially receives the data packet 800 sent from the packet communication apparatus 100 and supplies coding method information 802 to the control portion 209. The control portion 209 determines a coding method for the coded data 803 and a decoding method corresponding thereto based on the coding method information 802. The select portion 205 sequentially supplies the coded

data 803 to the first decoding portion 204-1. The first decoding portion 204-1 decodes the coded data 803 by using a first decoding method corresponding to the first coding method and creates audio and/or video signals. The select portion 203 supplies audio and/or video signals outputted from the first decoding portion 204-1 to the output portion 202. The output portion 202 converts the digital audio signals received from the select portion 203 to the analog audio signals or digital video signals received from the select portion 203 to the analog video signals (depending on which type of signal was received,). Then, the output portion 202 supplies the analog audio signals to the audio processing apparatus 201 and/or the analog video signals to the ~~video~~ image processing apparatus 213.

Next, ~~a~~ processing step ~~of a step~~ S302 will be described. In step S302, the control portion 109 of apparatus 100 determines whether or not the coding method needs to be switched from the first coding method to the second coding method. For example, when the control portion 109 detects a change in traffic in the packet network 112 and automatically determines that the coding methods needs to be changed from the first method to the second method, the control portion 109 switches the coding method from the first coding method to the second coding method (i.e., from 104-1 to 104-2). Further, when a user manipulates the operating portion 114 in order to instruct to change the coding method from the first coding method to the second

coding method, for example, the control portion 109 switches the coding method from the first coding method to the second coding method. When the coding method is switched from the first coding method to the second coding method, the control portion 109 starts preparation for coding audio and/or video signals having a same content by using a coding method before switched and a coding method after switched. The timer 115 starts measuring a predetermined time T1 (a time enough for the operation by the coding portion 104-2 to become stable) in accordance with an instruction from the control portion 109. The select portion 103 supplies the audio and/or video signals having a same content to the first coding portion 104-1 and the second coding portion 104-2 in accordance with an instruction from the control portion 109. The select portion 105 supplies the coded data 803 outputted from the first coding portion 104-1 to the communication 106 in accordance with an instruction from the control portion 109. However, the select portion 105 does not supply the coded data 813 outputted from the second coding portion 104-2 to the communication portion 106. It should be noted that, until the predetermined time T1 passed (a time enough for the operation of the second coding portion 104-2 to become stable), the coded data 813 outputted from the second coding portion 104-2 is prevented from being supplied to the communication portion 106.

Next, a processing step of a step S303 will be described. After the predetermined time T1 has passed (that is, after the coding processing of the second coding portion 104-2 has become stable), the control portion 109 supplies control data for requesting switching of the coding method (~~called~~ referred to as "switching response" below) to the communication portion 106. The communication portion 106 creates a control packet including a switching request and sends this to the packet communication apparatus 200.

The communication ~~apparatus~~ portion 206 of the apparatus 200 thereafter receives ~~a~~ the control packet (including the switching request) sent from the packet communication apparatus 100. In response to the request, the control portion 209 starts preparation for switching the coding method from the first coding method to the second coding method after receiving the switching request. Further, the timer 215 starts measuring a predetermined time T2 (a time sufficiently long enough for enabling an operation of the second decoding portion 204-2 to become stable) in accordance with an instruction from the control portion 209 in response to receiving the request.

Next, a processing step ~~of a step~~ S304 will be described. The select portion 105 supplies to the communication portion 106 the coded data 803 outputted from the first coding portion 104-1 and the coded data 813 outputted from the second coding portion 104-2 in accordance with the control portion 109. The communication portion 106 creates

a data packet 800 including the coded data 803 and a data packet 810 including the coded data 813 sequentially and sends them to the packet communication apparatus 200 in sequence. ~~sequentially~~. It should be noted that the communication portion 106 starts sending the data packet 800 and the data packet 810 without connecting a new call with the packet communication apparatus 200.

The communication portion 206 sequentially receives the data packet 800 and the data packet 810 sent from the packet communication apparatus 100 and supplies the coded data 803 and the coded data 813 to the select portion 205 and the coding method information 802 and 812 to the control portion 209. The control portion 209 determines a coding method for the coded data 803 and a decoding method corresponding thereto based on the coding method information 802 and determines a coding method for the coded data 813 and a decoding method corresponding thereto based on the coding method information 812. The select portion 205 supplies the coded data 803 to the first decoding portion 204-1 and coded data 813 to the second decoding portion 204-2 in accordance with an instruction from the control portion 209. The select portion 203 supplies audio and/or video signals outputted from the first decoding portion 204-1 to the output portion 202 in accordance with an instruction from the control portion 209. However, the audio and/or video

signals outputted from the second decoding portion 204-2 is prevented from being supplied to the output portion 202. The select portion 203 does not supply audio and/or video signals outputted from the second decoding portion 204-2 until the predetermined time T2 (an amount of time enough for enabling an operation of sufficiently long the second decoding portion 204-2 to become stable) has passed.

Next, a processing step ~~of a step~~ S305 will be described. After the predetermined time T2 has passed (that is, after the decoding processing by the second decoding portion 204-2 ~~gets~~ becomes stable), the select portion 203 supplies audio and/or video signals outputted from the second decoding portion 204-2 to the output portion 202 in accordance with an instruction from the control portion 209. However, audio and/or video signals outputted from the first decoding portion 204-1 ~~is~~ are prevented from being supplied to the output portion 202. The output portion 202 converts digital audio signals from the select portion 203 to analog audio signals and the digital video signals from the select portion 203 to the analog video signals. Then, the output portion 202 supplies the analog audio signals to the audio output apparatus 201 and analog video signals to the ~~video~~ apparatus 213. Further, the control portion 209 supplies control data corresponding to a switching request (~~called~~ referred to as a "switching response" below) to the communication portion 206. The communication portion 206 creates a control packet including

the switching response and then sends ~~it~~ the packet to the packet communication apparatus 100.

The communication portion 106 then receives the control packet (including the switching response) sent from the packet communication apparatus 200. The control portion 109 receives the switching response and then terminates processing for coding audio and/or video signals by using the first coding method.

Next, a processing ~~step of a~~ step S306 will be described. The control portion 109 receives the switching response and then supplies a switching confirmation to the communication portion 106. The communication portion 106 creates a control packet including the switching confirmation and then sends it to the packet communication apparatus 200.

Next, a processing ~~step of a~~ step S307 will be described. The select portion 103 supplies audio and/or video signals outputted from the input portion 102 to the second coding portion 104-2 but not to the first coding portion 104-1 in accordance with an instruction from the control portion 109. Further, the select portion 105 supplies coded data 813 outputted from the second coding portion 104-2 to the communication portion 106 in accordance with an instruction from the control portion 109. The communication portion 106 ~~sequentially~~ creates, in sequence, a data packet

810 including the coded data 813 and ~~sequentially~~ sends it in sequence to the packet communication apparatus 200. Since the packet communication apparatus 200 switches the coding method from the first coding method to the second coding method, the data packet 810 sent from the packet communication apparatus 100 can be decoded without any problems, which also can prevent the occurrence of noise, video turbulence and/or audio and/or video interruption.

Next, by referring to Fig. 4, another example of main processing steps performed by the packet communication apparatuses 100 and 200 according to the first embodiment will be described. In Fig. 4, during communication with the packet communication apparatus 100 (sending side), ~~it will be described~~ will be described processing steps where the packet communication apparatus 200 (receiving side) requests for switching a coding method. Further, in Fig. 4, like the description on Fig. 3, ~~it~~ will be described a case where it is assumed that the coding method before switching is a first coding method employed ~~included~~ by the first coding portion 104-1, for example, and the coding method after switching is a second coding method employed ~~included~~ by the second coding ~~method~~, for example, portion 104-2.

First ~~of all~~, a processing step ~~of a step~~ S401 will be described. ~~In~~ The processing step ~~at the step~~ S401 is the same as the processing step ~~at the~~ step S301, and thus the step described above ~~description will be omitted here~~. S401 will not be described in further detail herein.

Next, a processing ~~step of a~~ step S402 will be described. The control portion 209 determines whether or not the coding method must be switched from the first coding method to the second coding method. For example, when the control portion 209 detects a change in traffic in the packet network 112 and automatically determines that the coding method must be changed from the first coding method to the second coding method, the control portion 209 switches the coding method from the first coding method to the second coding method. Further, when a user manipulates the operating portion 214 to change the coding method from the first coding method to the second coding method, the control portion 209 switches the coding method from the first coding method to the second coding method. When the coding method has been switched from the first coding method to the second coding method, the control portion 209 supplies control data for requesting switching of the coding method (called "switching request" below) to the communication portion 206. The communication portion 206 creates a control packet including the switching request and then sends it to the packet communication apparatus 100.

The communication portion 106 then receives the control packet (including the switching request) sent from the packet communication apparatus 200. After receiving the switching request, the control portion 109 starts

preparation for coding audio and/or video signals having a same content by using the first and second coding methods. Further, the timer 115 starts measuring a predetermined time T1 (~~a~~ an amount of time sufficient enough for enabling the operation of the second coding portion 104-2 to be come stable) in accordance with an instruction from the control portion 109. The select portion 103 supplies the audio and/or video signals having a same content to the first coding portion 104-1 and the second coding portion 104-2 in accordance with an instruction from the control portion 109. The select portion 105 supplies coded data 803 from the first coding portion 104-1 to the communication portion 106 in accordance with an instruction from the control portion 109 but prevents coded data 813 output ted from the second coding portion 104-2 ~~to~~ from being supplied to the communication portion 106. It should be noted that, until the predetermined time T1 passes (~~a~~ an amount of time sufficient enough for enabling the operation of the second coding portion 104-2 to be come stable), the coded data 813 output ted from the second coding portion 104-2 is prevented from being supplied to the communication portion 106.

Next, a processing step ~~of a step~~ S403 will be described. After the predetermined time T1 has passed (that is, after the coding processing of the second coding portion 104-2 has become stable), the control portion 109 supplies a switching response to the communication portion 106. The

communication portion 106 then creates a control packet including the switching response and sends this to the packet communication apparatus 200 via the network 112.

The communication portion 206 thereafter receives the control packet (including the switching response) sent from the packet communication apparatus 100, and supplies the packet to control portion 209. The control portion 209 then starts preparation for switching the coding method from the first coding method to the second coding method after receiving the switching response. Further, the timer 215 starts measuring a predetermined time T2 (a time sufficiently long enough for enabling an operation of the second decoding portion 204-2 to become stable) in accordance with an instruction from the control portion 209.

Next, a processing ~~step of a~~ step S404 will be described. The select portion 105 supplies to the communication portion 106 the coded data 803 outputted from the first coding portion 104-1 and the coded data 813 outputted from the second coding portion 104-2 in accordance with a signal from the control portion 109. The communication portion 106 creates a data packet 800 including the coded data 803 and a data packet 810 including the coded data 813 sequentially and sends them to the packet communication apparatus 200 sequentially. It should be noted that the communication portion 106 starts sending the data packet 800 and the data packet 810 without connecting a new call with the packet

communication apparatus 200.

The communication portion 206 sequentially receives the data packet 800 and the data packet 810 sent from the packet communication apparatus 100 and supplies the coded data 803 and the coded data 813 to the select portion 205 and the coding method information 802 and 812 to the control portion 209. The control portion 209 determines a coding method for the coded data 803 and a decoding method corresponding thereto based on the coding method information 802 and determines a coding method for the coded data 813 and a decoding method corresponding thereto based on the coding method information 812. The select portion 205 supplies the coded data 803 to the first decoding portion 204-1 and coded data 813 to the second decoding portion 204-2 in accordance with an instruction from the control portion 209. The select portion 203 supplies audio and/or video signals outputted from the first decoding portion 204-1 to the output portion 202 in accordance with an instruction from the control portion 209. However, the audio and/or video signals outputted from the second decoding portion 204-2 is prevented from being supplied to the output portion 202. The select portion 203 does not supply audio and/or video signals outputted from the second decoding portion 204-2 until the predetermined time T2 (a time sufficiently long enough for enabling an operation of the second decoding portion 204-2 to become stable) has passed.

Next, a processing step ~~of a step~~ S405 will be described. After the predetermined time T2 has passed (that is, after the decoding processing by the second decoding portion 204-2 ~~gets~~ becomes stabilized), the select portion 203 supplies audio and/or video signals outputted from the second decoding portion 204-2 to the output portion 202 in accordance with an instruction from the control portion 209. However, audio and/or video signals outputted from the first decoding portion 204-1 ~~is~~ are prevented from being supplied to the output portion 202. The output portion 202 converts digital audio signals received from the select portion 203 to analog audio signals and the digital video signals received from the select portion 203 to the analog video signals. Then, the output portion 202 supplies the analog audio signals to the audio ~~output~~ processing apparatus 201 and analog video signals to the ~~video~~ image processing apparatus 213. Further, the control portion 209 supplies a switching confirmation to the communication portion 206. The communication portion 206 then creates a control packet including the switching confirmation and ~~then~~ sends it to the packet communication apparatus 100 via the network 112.

The communication portion 106 of the apparatus 100 then receives the control packet (including the switching confirmation) sent from the packet communication apparatus 200 and supplies the switching confirmation included in the control packet to the control portion 109. The control portion 109 receives the

switching confirmation and then terminates processing for coding audio and/or video signals by using the first coding method.

Next, ~~a~~ processing step ~~of a step~~ S406 will be described. The select portion 103 supplies audio and/or video signals outputted from the input portion 102 to the second coding portion 104-2 but not to the first coding portion 104-1 in accordance with an instruction from the control portion 109. Further, the select portion 105 supplies coded data 813 outputted from the second coding portion 104-2 to the communication portion 106 in accordance with an instruction from the control portion 109. The communication portion 106 sequentially creates a data packet 810 including the coded data 813 and sequentially sends it to the packet communication apparatus 200. Since the packet communication apparatus 200 switches the coding method from the first coding method to the second coding method, the data packet 810 sent from the packet communication apparatus 100 can be decoded without any problems, which also can prevent the occurrence of noise, video turbulence and/or audio and/or video interruption.

Next, a main processing step of the packet communication apparatus 100 (sending side) according to the first embodiment will be described by referring to the flowchart in Fig. 5.

In a step S501, the control portion 109 determines whether or not the coding method must be switched from the first coding method to the second coding method. When the coding method is switched ("yes" in step S501), the flowchart goes to a step S503. On the other hand, when the coding method is not switched ("No" in step S501), the flowchart goes to a step S502.

In the step S502, the control portion 109 determines whether or not a control packet including a switching request has been received or not. When the switching request has been received ("yes" in step S502), the flowchart goes to a step S504. On the other hand, when the switching request has not been received ("NO" in step S502), the flowchart goes to a step S501.

Next, a processing ~~step of a~~ step S503 in Fig. 5 will be described by referring to a flowchart in Fig. 6.

In a step S601, the control portion 109 starts preparation for coding audio and/or video signals having a same content by using a coding method before switching and a coding method after switching.

In a step S602, the control portion 109 determines whether or not a predetermined time T1 (a time sufficiently long enough for the coding processing by the coding portion 104-2 to become stable) has passed. If the predetermined time has passed ("yes" in step S602), the flowchart goes to a step S603.

In the step S603, the control portion 109 supplies a switching request to the communication portion 106. the

communication portion 106 creates a control packet including the switching request and ~~the~~ sends it to the packet communication apparatus 200. After sending the switching request, the communication portion 106 starts sending audio and/or video signals coded by using the coding method before switch~~ed~~ing and audio/video signals coded by using the coding method after switch~~ed~~ing.

In ~~a~~ step S604, the control portion 109 determines whether or not the control packet including a switching response could be received within a predetermined time. If the switching response could be received ("yes" in step S604), the flowchart goes to a step S606. On the other hand, if the switching request could not be received ("no" in step S604), the flowchart goes to a step S605.

In the step S605, the control portion 109 controls the audio and/or video signals coded by using the coding method before switch~~ed~~ing to be sent to the packet communication apparatus 200. Further, the control portion 109 controls the audio/video signals coded by using the coding method after switch~~ed~~ing not to be sent to the packet communication apparatus 200.

In the step S606, the control portion 109 controls the audio and/or video signals coded by using the coding method before switched not to be sent to the packet communication apparatus 200. Further, the control portion 109 controls the audio and/or video signals coded after switched to be

sent to the packet communication apparatus 200.

In a step S607, the control portion 109 supplies a switching confirmation to the communication portion 106. The communication portion 106 creates a control packet including the switching confirmation and then sends it to the packet communication apparatus 200 via the network 112.

Next, a processing step ~~of a step~~ S504 in Fig. 5 will be described by referring to a flowchart in Fig. 7.

In a step S701, the control portion 109 starts preparation for coding audio and/or video signals having a same content by using a coding method before switched and a coding method after switched.

In a step S702, the control portion 109 determines whether or not a predetermined time T1 (a time arrangement of sufficiently long enough for a coding process by the coding portion 104-2 to be one stable enabling) has passed. If the predetermined time has passed, the flowchart goes to a step S703.

In the step S703, the control portion 109 supplies a switching response to the communication portion 106. The communication portion 106 creates a control packet including the switching response and then sends it to the communication apparatus 200 through network 112. After sending the switching response, the communication portion 106 starts sending audio and/or video signals coded by the coding method before switching and audio and/or video signals coded by using the

coding method after switching.

In a step S704, the control portion 109 determines whether or not the control packet including a switching confirmation could be received within a predetermined time. If the switching confirmation could be received, the flowchart goes to a step S706. On the other hand, if the switching confirmation could not be received, the flowchart goes to a step S705.

In the step S705, the control portion 109 controls the audio and/or video signals coded by using the coding method before switching to cause those signals to be sent to the packet communication apparatus 200. Further the control portion 109 controls the audio/video signals coded by using the coding method after switching, so as to prevent those signals from being sent to the packet communication apparatus 200.

In the step S706, the control portion 109 controls the audio and/or video signals coded by using the coding method before switching, so as to prevent those signals from being sent to the packet communication apparatus 200. Further the control portion 109 controls the audio and/or video signals coded by using the coding method after switching so as to cause those signals to be sent to the packet communication apparatus 200.

As described above, according to the first embodiment, even when a coding method is switched during communication with the other party, the occurrence of noise, turbulence of

video, and interruption of audio and/or video could be prevented.

Further, according to the first embodiment, the audio and/or video signals coded by using a coding method after switching is not sent until a coding process becomes stable. Thus, even when a coding method feeding back past information is switched, the occurrence of noise, turbulence of video, and interruption of audio and/or video could be prevented.

Furthermore, according to the first embodiment, audio and/or video signals coded by using a coding method after switching can be sent without connecting a new call, which eliminates a need for complicated communication processes. Thus, the communication efficiency can be improved.

Embodiment 2

In the first embodiment, a case was described where audio and/or video signals coded by using a coding method before switching and audio and/or video signals coded by using a coding method after switching are packetized in separate data packets.

On the other hand, in a second embodiment of the invention, a case will be described where audio and/or video signals coded by using a coding method before switching and audio and/or video signals coded by using a coding method after switching are packetized in a same data packet.

Next, a construction of data packet according to the second embodiment will be described by referring to Fig. 9.

As shown in Fig. 9, a data packet 900 according to the second embodiment includes a header 901, coding method information 802, coded data 803, coding method information 812, coded data 813, and a footer 904. The header 901 includes information for identifying the other communicating party, for example. The coding method information 802 includes information indicating a coding method for the coded data 803 and a decoding method corresponding thereto. The coded data 803 includes audio and/or video signals coded by using a coding method before switching (e.g., a first coding method of a first coding portion 104-1). The coding method information 812 includes information indicating a coding method for coded data 813 and a decoding method corresponding thereto. The coded data 813 includes audio and/or video signals coded by using a coding method after switching (e.g., a second coding method of a second coding portion 104-2). The footer 904 includes information for detecting or correcting an error occurred in a data packet, for example.

Next, by referring to Fig. 10, will be described an example of main processing steps of packet communication apparatuses 100 and 200 according to the second embodiment. In Fig. 10, will be described processing steps for a case

where, during communication with the packet communication apparatus 200 (receiving side), the packet communication apparatus 100 (sending side) requests switching of a coding method. Further, in Fig. 10, it is assumed that the coding method before switched is a first coding method ~~that~~ a first coding portion 104-1 ~~includes,~~ for example, ~~while it is~~ and ~~assumed~~ that the coding method after switched is, for example, a second coding method ~~that~~ a second coding portion 104-2 ~~includes, for example.~~ It should be noted that only processing steps ~~will be described in detail which~~ that are different from the processing steps shown in Fig. 3, will be described hereinafter, and ~~the same reference numerals will be given to the~~ processing steps that are similar to those in Fig. 3 ~~and the description thereof~~ will be omitted herein. are identified by the same reference numerals in Figs. 3 and 10, and a further description of those steps

A processing ~~step of a~~ step S1001 will now be described. The select portion 105 supplies coded data 803 outputted from the first coding portion 104-1 and coded data 813 outputted from the second coding portion 104-2 to the communication portion 106 in accordance with an instruction from the control portion 109. The communication portion 106 then creates a data packet 900 including the coded data 803 and the coded data 813 sequentially, and sends them to the packet communication apparatus 200 sequentially via network 112. The communication portion 106 then starts sending the data packet 900 without connecting a new call with the packet communication

apparatus 200.

The communication portion 206 sequentially receives the data packet 900 sent from the packet communication apparatus 100 and supplies coded data 803 and coded data 813 to the select portion 205 and coding method information 802 and 812 to the control portion 209. The control portion 209 determines a coding method for the coded data 803 and a decoding method corresponding thereto based on the coding method information 802. The select portion 205 supplies the coded data 803 to the first decoding portion 204-1 and supplies the coded data 813 to the second decoding portion 204-2 in accordance with an instruction from the control portion 209. The select portion 203 supplies audio and/or video signals outputted from the first decoding portion 204-1 to the output portion 202 but does not supply audio and/or video signals outputted from the second decoding portion 204-2 to the output portion 202, in accordance with an instruction from the control portion 209. The select portion 203 does not supply audio and/or video signals outputted from the second decoding portion 204-2 to the output portion 202 until a predetermined time T2 (a time enough for an operation of the second decoding portion 204-2 to be stable) has passed.

Next, by referring to Fig. 11, ~~it~~ will be described another example of main processing steps of packet communication apparatuses 100 and 200 according to the

second embodiment of the invention. In Fig. 11, ~~it~~ will be described processing steps in a case where, during communication with the packet communication apparatus 100 (sending side), the packet communication apparatus 200 (receiving side) requests switching of a coding method. Further, in Fig. 11, in the same manner as the description for Fig. 10, it is assumed that the coding method before switching is, for example, a first coding method ~~that~~ of a first coding portion 104-1, ~~includes, for example, while it is assumed~~ and that the coding method after switching is ~~is~~ a second coding method ~~that~~ of a second coding portion 104-2 ~~includes~~, for example. It should be noted that processing steps will be described in detail in Fig. 11, herein, which are different from the processing steps shown in Fig. 4, and the same reference numerals ~~will be given to~~ are used in the following description for the processing steps that are similar to those in Fig. 4, and ~~the~~ a detailed description ~~thereof~~ of those steps will be omitted herein.

First, a processing ~~step of a~~ step S1101 will be described. The select portion 105 supplies coded data 803 outputted from the first coding portion 104-1 and coded data 813 outputted from the second coding portion 104-2 to the communication portion 106 in accordance with an instruction from the control portion 109. The communication portion 106 creates a data packet 900 including the coded data 803 and the coded data 813 sequentially, and sends them to the packet communication apparatus 200 sequentially as part of the data packet 900. The communication

portion 106 starts sending the data packet 900 without connecting a new call with the packet communication apparatus 200.

The communication portion 206 thereafter sequentially receives the data packet 900 sent from the packet communication apparatus 100 and supplies coded data 803 and coded data 813 to the select portion 205 and coding method information 802 and 813 to the control portion 209. The control portion 209 determines a coding method for the coded data 803 and a decoding method corresponding thereto based on the coding method information 802. The select portion 205 supplies the coded data 803 to the first decoding portion 204-1 and supplies the coded data 813 to the second decoding portion 204-2 in accordance with an instruction from the control portion 209. The select portion 203 supplies audio and/or video signals outputted from the first decoding portion 204-1 to the output portion 202 but does not supply audio and/or video signals outputted from the second decoding portion 204-1 to the output portion 202, in accordance with an instruction from the control portion 209. The select portion 203 does not supply audio and/or video signals outputted from the second decoding portion 204-2 to the output portion 202 until a predetermined time period T2 (a time period sufficiently long enough for ~~an~~ enabling the operation of the second decoding portion 204-2 to become stable) has passed.

As described above, according to the second embodiment,

like the first embodiment, even when a coding method is switched during communication with ~~the~~ an other party, the occurrence of noise, turbulence of video, interruption of audio and/or video ~~could~~ can be prevented.

Further, according to the second embodiment, audio and/or video signals coded by a coding method before switched ing and audio and/or video signals coded by a coding method after switched ing can be packetized in a same data packet. Thus, the communication efficiency ~~can be~~ is improved even more than that provided in the first embodiment.

Further, according to the second embodiment, like the first embodiment, the ~~coding~~ decoding method is not switched until a decoding process of a decoding method after switched ing becomes ~~gets~~ stable. Thus, even when the decoding method after switched ing is a decoding method feeding back past information, the occurrence of noise, turbulence of video, interruption of audio and/or video ~~could be~~ is prevented.

Furthermore, according to the second embodiment, audio and/or video signals coded by using a coding method after switched ing can be sent without connecting a new call, which eliminates a need for complicated communication processes. Thus, the communication efficiency can be improved.

Another Embodiment

~~A~~ It should be noted that part or all of functions described in each of the

above-described embodiments can be implemented by a control program. In such a case, the control portion within an apparatus described in each or the above-described embodiments uses ~~a~~ the control program for implementing ~~a~~ either part or all of functions described in each of the above-described embodiments to implement ~~a~~ part or all of functions described in each of the above-described embodiments. In this case, a memory medium for storing the control program may be a floppy disk, a hard disk, an optical disk, a photomagnetic disk, a CD-ROM, a magnetic tape, a non-volatile memory card, or a ROM, for example.

The invention may be embodied in other specific forms without departing from essential characteristics thereof.

For example, in the above-described embodiments, a case has been described where in a coding method before switching is a first coding method and a coding method after switching is a second coding method. However, the present invention is not limited thereto. It is possible that the coding method before switching is an a^{th} (a = 1 to N) coding method and the coding method after switching is b^{th} (b = 1 to N, b ≠ a).

Therefore, the above-~~mentioned~~ described embodiments are merely exemplary of this invention ~~examples in all respects~~, and ~~must~~ are not to be construed to limit the scope of the present invention.

The scope of the present invention is defined by the scope of the appended claims, and is not limited ~~at all by~~

to only the specific descriptions ~~of~~ in this specification. Furthermore, all the modifications and changes belonging to equivalents of the claims are considered to fall within the scope of the present invention.

4. ABSTRACT OF THE DISCLOSURE

A packet communication device (sending side) sends audio and/or video signals coded by a first coding method and then sends audio and/or video signals coded by a second coding method ~~until the other communicating party gets ready completely when a coding method is switched from the first coding method to the second coding method, during communication with the other communicating party~~ until a receiving device is prepared to receive second coded data to the receiving device, all while communicating with the receiving device. The packet communication apparatus (receiving side) outputs audio and/or video signals decoded by using a second decoding method after decoding processes of the second decoding method (corresponding to the second coding method) become ~~gets~~ stable. ~~Having this construction~~ These features can prevent the occurrence of noise, turbulence of video, and/or interruption of audio and/or video even when the coding method is switched during communication ~~with the other communicating party~~ between the communication device and the receiving device.